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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,315	12/20/2001	Tomohiro Makigaki	P3277.D1	8083

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EPSON RESEARCH AND DEVELOPMENT INC
INTELLECTUAL PROPERTY DEPT
150 RIVER OAKS PARKWAY, SUITE 225
SAN JOSE, CA 95134

EXAMINER

MOUTTET, BLAISE L

ART UNIT PAPER NUMBER

2853

DATE MAILED: 08/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/026,315

Applicant(s)

MAKIGAKI ET AL.

Examiner

Blaise L Mouttet

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 5-20 is/are rejected.
- 7) ☒ Claim(s) 21 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/423,788.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 5-21 in the paper filed June 20, 2003 is acknowledged.

Specification

2. The examiner suggests that the abstract be replaced by the following:

--A silicon nozzle plate is disclosed including nozzles each with a first nozzle portion having a circular cross-section and a second nozzle portion having a circular cross-section wherein the circular cross-section of the first nozzle portion is smaller than the circular cross-section of the second nozzle portion. In one embodiment the nozzle plate is utilized in an inkjet head and includes a recess which commonly communicates with a plurality of first nozzle portions and a through hole that exposes terminal portions that supply control signals to pressure generators.--

The above suggestion is made to facilitate future searching and is not meant to be applied to the interpretation of any claims.

Claim Objections

3. Claim 21 is objected to because in line 5 "formed on" should more properly read --formed in--, --formed within-- or --formed through--. It is clear when read in light of the specification that applicant is referring to a through hole formed in the silicon substrate rather than a through hole formed "on" the silicon substrate.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 5-9 and 13-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Silverbrook EP 498 291 A1.

Initially the examiner notes that when examining claims directed to a product it is the structure of the product itself that is at issue when determining patentability. While the applicant has included several limitations regarding the method of manufacture it is the end structure implied by the process steps and not the process steps that determine patentability. See MPEP 2113 for further discussion and pertinent case law citation on this point.

Silverbrook discloses, regarding claim 5, an ejection device comprising:

a nozzle plate (100) comprising a silicon substrate having a first (front) surface and a second (back) surface (figures 9-12, page 6, lines 39-43);

a first nozzle portion (113) having a circular cross-section, the first nozzle portion formed on the first surface of the silicon substrate (figure 9, page 6, lines 21-22, page 18, line 38-41); and

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a second nozzle portion (114) having a circular cross-section, the second nozzle portion formed on the second surface of the silicon substrate, and communicating with the first nozzle portion (113) (figure 9, page 6, lines 21-22, page 18, line 38-41);

wherein the circular cross-section of the first nozzle portion (113) is smaller than the circular cross-section of the second nozzle portion (114), the first and second nozzle portions forming a nozzle having a cross-section smaller stepwise from a rear end toward a front end of the nozzle (figure 9, page 6, lines 8-14).

Regarding claims 6, 8 and 9, the examiner notes that the manufacturing steps cited do not differentiate the claimed structure from the structure of Silverbrook. Nevertheless it is noted that Silverbrook teaches plasma etching in the formation (page 6, lines 1-14).

Regarding claim 7, the recess is shown as reference (112) in figure 9.

Silverbrook discloses, regarding claim 13, an inkjet head comprising:

a nozzle plate (100) comprising a silicon substrate having a first (front) surface and a second (back) surface (figures 9-12, page 6, lines 39-43);

a first nozzle portion (113) having a circular cross-section, the first nozzle portion formed on the first surface of the silicon substrate (figure 9, page 6, lines 21-22, page 18, line 38-41);

a second nozzle portion (114) having a circular cross-section, the second nozzle portion formed on the second surface of the silicon substrate, and communicating with the first nozzle portion (113) (figure 9, page 6, lines 21-22, page 18, line 38-41); and

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a second substrate (210) including ink passages (211-214), the second substrate being bonded to the second surface of the silicon substrate such that the ink passage communicates with the second nozzle portion (114) (figure 5, page 5, lines 31-36),

wherein the circular cross-section of the first nozzle portion (113) is smaller than the circular cross-section of the second nozzle portion (114), the first and second nozzle portions forming a nozzle having a cross-section smaller stepwise from a rear end toward a front end of the nozzle (figure 9, page 6, lines 8-14).

Regarding claims 14, 16 and 17, the examiner notes that the manufacturing steps cited do not differentiate the claimed structure from the structure of Silverbrook. Nevertheless it is noted that Silverbrook teaches plasma etching in the formation (page 6, lines 1-14).

Regarding claim 15, the recess is shown as reference (112) in figure 9.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 10-12 and 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook EP 498 291 in view of Kimura et al. US 5,389,957.

Initially the examiner notes that when examining claims directed to a product it is the structure of the product itself that is at issue when determining patentability. While the applicant has included several limitations regarding the method of manufacture it is the end structure implied by the process steps and not the process steps that determine patentability. See MPEP 2113 for further discussion and pertinent case law citation on this point.

Silverbrook discloses, regarding claim 10, an ejection device comprising:

a nozzle plate (100) comprising a silicon substrate having a first (front) surface and a second (back) surface (figures 9-12, page 6, lines 39-43);

a plurality of first nozzle portions (113) each having a circular cross-section, the first nozzle portions formed on the first surface of the silicon substrate (figure 5, figure 9, page 6, lines 21-22, page 18, line 38-41);

a plurality of second nozzle portions (114) having a circular cross-section, the second nozzle portions formed on the second surface of the silicon substrate, and

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communicating with the first nozzle portions (113) (figure 5, figure 9, page 6, lines 21-22, page 18, line 38-41);

wherein the circular cross-section of the first nozzle portions (113) is smaller than the circular cross-section of the second nozzle portions (114), the first and second nozzle portions forming nozzles having a cross-section smaller stepwise from a rear end toward a front end of the nozzle (figure 9, page 6, lines 8-14).

Regarding claims 11 and 12, the examiner notes that the manufacturing steps cited do not differentiate the claimed structure from the structure of Silverbrook. Nevertheless it is noted that Silverbrook teaches plasma etching in the formation (page 6, lines 1-14).

Silverbrook discloses, regarding claim 18, an inkjet head comprising:

a nozzle plate (100) comprising a silicon substrate having a first (front) surface and a second (back) surface (figures 9-12, page 6, lines 39-43);

a plurality of first nozzle portions (113) each having a circular cross-section, the first nozzle portions formed on the first surface of the silicon substrate (figure 5, figure 9, page 6, lines 21-22, page 18, line 38-41);

a plurality of second nozzle portions (114) having a circular cross-section, the second nozzle portions formed on the second surface of the silicon substrate, and communicating with the first nozzle portions (113) (figure 5, figure 9, page 6, lines 21-22, page 18, line 38-41);

wherein the circular cross-section of the first nozzle portions (113) is smaller than the circular cross-section of the second nozzle portions (114), the first and second

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nozzle portions forming nozzles having a cross-section smaller stepwise from a rear end toward a front end of the nozzle (figure 9, page 6, lines 8-14); and

a second substrate (210) including ink passages (211-214), the second substrate being bonded to the second surface of the silicon substrate such that the ink passage communicates with the second nozzle portion (114) (figure 5, page 5, lines 31-36).

Regarding claims 19 and 20, the examiner notes that the manufacturing steps cited do not differentiate the claimed structure from the structure of Silverbrook. Nevertheless it is noted that Silverbrook teaches plasma etching in the formation (page 6, lines 1-14).

Silverbrook fails to disclose a recess formed on the first surface of the silicon substrate which commonly communicates with the plurality of nozzle portions such that the front end of each of the nozzles is exposed to the recess.

Kimura et al. teaches a nozzle configuration for an inkjet head in which a recess formed on the first surface of a nozzle substrate (400) which commonly communicates with the plurality of nozzle portions (41) such that the front end of each of the nozzles is exposed to the recess (figures 10-11C). This provides simpler cleaning and maintenance operation for the nozzle substrate (column 1, lines 54-62, column 13, lines 23-38).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include a common recess for the plurality of nozzle portions of Silverbrook as taught by Kimura et al.

The motivation for doing so would have been in order to making cleaning and maintenance operations of the nozzle substrate easier as taught by column 1, lines 54-62 of Kimura et al.

Additional Prior Art

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bassous US 3,921,916, Kendell et al. US 4,047,186, Kattner US 4,209,794, Gadner et al. US 4,828,184, Bibbe et al. US 5,491,499 and Chen et al. US 6,454,393 disclose various nozzle taper configurations all of which contain a first and second portion of different cross-sectional areas formed in a stepped configuration.

Tamura US 5,157,418 discloses the use of through holes in forming wiring connections for ink jet heads.

Barr et al. US 5,519,421 discloses forming through holes (windows 44, 45) in a polymeric nozzle member for providing electrical connection with ink ejection pressure generators.

Allowable Subject Matter

7. Claim 21 is objected to as noted above and also as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and provided the above noted objection is overcome.

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The following is a statement of reasons for the indication of allowable subject matter:

The primary reason for the indication of the allowability of claim 21 is the inclusion therein, in combination as currently claimed, of the limitation of a through-hole formed in the silicon substrate including the nozzle portions as claimed that exposes the terminal portions. This limitation is found in claim 21 and is neither disclosed nor taught by the prior art of record, alone or in combination.

The examiner notes that while through-hole formation for electrical connection was known to the prior art (see Tamura '418 and particularly Barr et al. '421 for through hole connection through a nozzle member) it is clear that the ink jet head of Silverbrook '291 contains the pressure generating elements (120) integrally with the nozzle substrate (100) rather than part of a second substrate (figure 9). Thus the electrical connection is a surface connect configuration (as discussed in relation to figures 47 and 48) and there is no reason to have a through-hole in the nozzle substrate (100) for electrical connection to the pressure generating elements (120) since the pressure generating elements (120) are embedded in the nozzle substrate (100). It is noted that Chen et al. '393 which also teaches a circular cross-section silicon nozzle structure with stepped diameter portions teaches away from forming windows in the nozzle (column 4, lines 11-15) and instead provides a control layer (58) for the electrical connection.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Blaise Mouttet whose telephone number is (703) 305-3007. The examiner can normally be reached on Monday-Friday from 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, Art Unit 2853, can be reached at (703) 308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Blaise Mouttet August 1, 2003

Bm AUG. 1, 2003



Stephen D. Meier
Primary Examiner